Forestry Technical Work Group
Summary List of Recommended High Priority Mitigation Options

#	Mitigation Option Name	Straw Proposal Development Status
F-1	Improved Forest Health (originally 2.6)	Ready for CAT Review
F-2	Reduced Conversion to Nonforest Cover (originally 2.1)	Ready for CAT Review
F-3	Enhanced Carbon Sequestration in Forests (originally 2.4)	Ready for CAT Review
F-4	Expanded Use of Wood Products for Building Materials (originally 3.3)	Ready for CAT Review
F-5	Expanded Use of Biomass Feedstocks for Electricity, Heat and Steam Production (originally 1.1)	Ready for CAT Review
F-6	Improved Commercialization of Advanced Lignocellulosic Processes (hydrolysis, gasification, pyrolysis or other) (originally 1.4, with 1.2 as a subset)	Ready for CAT Review
F-7	Enhanced Carbon Sequestration in Harvested Wood Products (originally 2.5)	Ready for CAT Review
F-8	Urban and Community Forests	Ready for CAT Review

Options previously reviewed and affirmed by the CAT are available on the CAT website under the most recent meeting of the Forestry TWG.
http://www.ecy.wa.gov/climatechange/cat_twg_forest.htm

F-1. Improved Forest Health

Straw Proposal Development Status: Ready for CAT Review

Based on Forestry Catalog Option 2.6

Mitigation Option Description

Promote forest management strategies which reduce GHG emissions from Washington State forests resulting from wildfire, pest, and disease. Annually wildfire contributes at least 0.18 MMTCO2e/yr, or 0.2% of the state emissions total (Westcarb I, 2007[1]). Through incentive and regulatory programs that reduce the risk of wildfire, pest, and disease outbreaks this proposed option will aim to reduce fuels buildup attributable to decades of fire suppression and subsequent use of woody biomass for bioenergy production.

Implicit within this mitigation option is the recognition that:
- Wildfires play an important ecological role in the natural forest lifecycle yet millions of acres of Washington's forestlands are at uncharacteristic risk due to past management practices.
- Forests, depending on their existing characteristics and on how they are managed, may be a net source or a net sink of CO2.
- Eastern and Western Washington have unique forestland types and forest health challenges and should be treated differently.
- Implementation methods must be balanced and integrated with other policy options including those focused on carbon sequestration, biofuels and feedstocks, conversion and afforestation.

Healthy, well-managed forests also provide other important public benefits, including durable wood products, fish and wildlife habitat, species biodiversity, clean and adequate supplies of water, and recreational opportunities.

Mitigation Option Design

- **Goals:**
  - Reduce the rate of wildfire volatized GHG emissions through 50,000 acres/year reductions in forestland acres "at-risk" of catastrophic wildfire (those acres that need to be thinned or are impacted by insects and disease);
  - Restore 25% (500,000 acres) of Washington's "at-risk" state and private forestland, including 50% (XX[2] acres) in NE Washington, to a characteristically healthy state by the year 2020;

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[1] *This figure was the average for the years from 1990 through 1996, a period which preceded the larger fire seasons recently experienced. Current and projected emissions are likely to be significantly greater in the baseline case, and validation is needed for the methodology.*

[2] *waiting for E vs. W side statistics from DNR's Karen Ripley, or Dwayne Vaugen to fill in XX's*

- o Restore 50% (1.0 million acres) of Washington's "at-risk" forestland (all ownership categories) to a characteristically healthy state by the year 2035;
- o Restore 100% (2.0 million acres) of Washington's "at risk" forestland (all ownership categories) to a characteristically healthy state by the year 2050.

- **Timing:** See goals above.

- **Coverage of parties:** Private forestland owners and managers, State-owned forest land managers, USDA Forest Service.

- **Other:**

Implementation Mechanisms:

[TWG has begun to provide input; to be discussed at next CAT meeting]

Related Policies/Programs in Place

[TWG has begun to provide input; to be discussed at next CAT meeting]

Types(s) of GHG Reductions

TBD

Estimated GHG Savings (in 2020) and Costs per MtCO$_2$e

Data Sources:

[TWG has begun to provide input; to be discussed at next CAT meeting]

- **Quantification Methods:**

- **Key Assumptions:**

Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**

- **Job Creation:**

- **Reduced Fuel Import Expenditures:**

Key Uncertainties

[TWG has begun to provide input; to be discussed at next CAT meeting]

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

F-2. Reduced Conversion to Nonforest Cover

Straw Proposal Development Status: Ready for CAT Review

Based on Forestry Catalog Option 2.1

Mitigation Option Description

Reduce conversion of forest lands to non-forest cover and to reduce the rate at which forested tracts are parceled and/or fragmented. The conversion of forestlands to other uses is a direct cause of carbon emissions due to the loss of biomass and soil disturbance. Non-forested areas contain lower amounts of biomass and associated carbon reserves. These areas also have less capacity to sequester carbon dioxide than forested areas.

Implicit within this mitigation option is the recognition that 1) forests, depending on how they are managed, may be a net source or a net reservoir of CO2 and 2) a continuous loss of forestland regardless of the rate will ultimately lead to loss of all forested land. This proposed option will promote the development of incentive programs that maintain forestland by reducing conversion and promoting forests' ability to continue to sequester carbon. This proposed option additionally aims to position Washington State forestland owners to participate in emerging carbon trading markets. This policy will include an analysis of population growth and its impact on forest land conversion and how incentives can minimize its impacts until an elimination of conversion is achieved. If these voluntary programs selected are not attaining the desired resolute, then it will be the responsibility of the state to increase or enhance the incentives so that landowners are providing the desired sequestration service.

Mitigation Option Design

- **Goals:**
    - Reduce the acres of forestland expected to be lost to non-forest uses by 70% by 2020.

- **Timing:** Policy initiation: by 2010 reduce expected loss by 10%, by 2020 reduce the expected loss by 70% .

- **Coverage of parties:**

- **Other:** It will take some time to develop and implement market initiatives and incentives programs that can stem the rate of conversion to non-forest use and for those reasons the 2010 goal is modest. But it is expected that with the full implementation of many of the mechanisms listed below dramatic decreases in the rate of conversion will be achieved. If these voluntary mechanisms are affective we hope to see an increase in forested land after 2030.

- Since the 1930's, Washington State has lost 2 million acres of timberland to other uses. But the trend has accelerated: over the next several years, 300,000 acres of Western Washington timberland is likely to be converted   to other uses (Alig et al, 2003).

Two demographic surveys conducted by Washington State University (WSU) and the Washington Farm Forestry Association also revealed that the average age of small forest landowners is between 57 – 67 years old. These figures imply that a large percentage of this land base will change hands within a generation, likely leading to increased fragmentation and conversion.

Implementation Mechanisms:

[TWG has begun to provide input; to be discussed at next CAT meeting]

Related Policies/Programs in Place

TBD

Types(s) of GHG Reductions

TBD

Estimated GHG Savings (in 2020) and Costs per MtCO$_2$e

- **Data Sources:**

- **Quantification Methods:**

- **Key Assumptions:**

Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**

- **Job Creation:**

- **Reduced Fuel Import Expenditures:**

Key Uncertainties

[Insert text here]

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

F-3. Enhanced Carbon Sequestration in Forests

Straw Proposal Development Status: Ready for CAT Review

Based on Forestry Catalog Option 2.4

Mitigation Option Description

Washington forests have a significant role to play in decreasing net emissions of carbon dioxide (CO_2) by removing CO_2 from the atmosphere. Our forests are among the most productive in the world, and programs designed to encourage management of our forests for increased overall forest carbon stocks can be an important part of the state's climate action strategy. Special programmatic emphasis should be placed on opportunities to increase and maintain overall carbon storage in the most stable reservoirs in the forest environment, especially stems, roots, and soils.

This mitigation option is designed to promote the removal of additional CO_2 from the atmosphere by increasing and maintaining overall carbon stocks in Washington forests relative to a "business as usual" baseline. Net storage of forest carbon is influenced by many factors, including the conversion of forests to non-forest uses, forest health, and the wood products manufacturing process. These and other important issues related to enhanced carbon sequestration in Washington forests are addressed in other forestry mitigation options. In addition, this mitigation option includes as a policy goal the preservation of our state's public and private working forests. In support of this goal, this proposed option aims to position our state's public and private working forests to participate in emerging carbon trading markets.

Mitigation Option Design

- **Goals:** Help position Washington forest landowners to participate meaningfully in emerging carbon markets by implementing programs and incentives which, together with emerging market opportunities, will increase absolute levels of sequestered carbon relative to the business as usual baseline in Washington forests (exclusive of Federal and Tribal forestlands) by 10% by 2020 and 40% by 2050.

- **Timing:**

- Undertake and complete analysis necessary to determine business as usual baseline by _____.

- Develop accounting protocols to measure absolute changes in overall carbon stocks by ____.

- Adopt legislation and rules necessary to implement programs and incentives for healthy, native forests that support environmental values by ____.

- **Coverage of parties:** Washington Governor; Washington Legislature; Executive Departments (e.g. Ecology, DNR, CTED; OFM; Revenue); Climate Action Challenge

stakeholders; large and small forest landowners; foresters and climate scientists; and general public.

- **Other:**

Implementation Mechanisms:

[TWG has begun to provide input; to be discussed at next CAT meeting]

Related Policies/Programs in Place

TBD

Types(s) of GHG Reductions

TBD

Estimated GHG Savings (in 2020) and Costs per MtCO$_2$e

- **Data Sources:**

- **Quantification Methods:**

- **Key Assumptions:**

Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**

- **Job Creation:**

- **Reduced Fuel Import Expenditures:**

Key Uncertainties

[Insert text here]

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

F-4. Expanded Use of Wood Products for Building Materials

Straw Proposal Development Status: Ready for CAT Review

Based on Forestry Catalog Option 3.3

Mitigation Option Description

This policy seeks to enhance the use of long-lived wood products as a strategy for reducing GHG emissions. Wood products not only store significant amounts of carbon but they are also less energy intensive to manufacture than substitute materials. The climate benefits of using wood products as opposed to substitute materials have been documented in numerous life cycle assessments.

Enhancement of wood product use can be achieved through transparent inclusion of carbon footprint/embodied energy information in green building standards and in consumer literature. Any increase must be done with consideration of practical use of the material and of material costs.

Mitigation Option Design

- **Goals:** To expand the use of wood products for building materials, where appropriate, by 10% over current levels

- **Timing:** Increase usage by 5% by 2010 and 10% by 2020, above current trends

- **Coverage of parties:** Builders, building material suppliers, wood product industries, recycled building material sellers, home improvement stores and consumers. All state agencies should lead through example.

- **Other:** Wood products not only serve as long-term carbon storage but also require much less energy to manufacture than substitute materials such as concrete or steel. This difference in energy use is so significant that one study found a substitution for steel and concrete framing representing 6 to 8 percent of the total house weight resulted in an increase in greenhouse gas emissions of 26 to 31 percent respectively[3]. Other studies have echoed these same results. Eriksson's (2003) compilation of building life cycle assessments (LCAs) concluded that using wood-framed housing in the 1.7 million housing starts in Europe[4] would save 35-50 MMtCO2e, which would be enough to contribute 11-16% of the emissions reduction needed for Europe to meet the Kyoto requirement. Buchanon and Levine (1999) report that a 17% increase in wood usage in

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[3] Taken from the CORRIM study, Perez-Garcia, Bruce Lippke, David Briggs, James Wilson, James Bowyer and Jaime Meil. 2005. The Environmental performance of renewable building materials in the context of residential construction. *Wood and Fiber Science* 37, CORRIM Special Issue: 3-17.

[4] Currently only 5% of new construction in Europe uses wood framing

the New Zealand building industry could result in a reduction of 484,000 MMtCO2e. This reduction is equivalent to a 20% reduction in carbon emissions from the New Zealand building industry and roughly a 1.8% of New Zealand's total GHG emissions. Miner et al (2006) report that, according to the CORRIM work, if 1.5 million housing starts in the U.S. used wood framed houses rather than non-wood building systems, 9.6 MMtCO2e per year would be kept out of the atmosphere. This savings is equivalent to keeping roughly two million cars of the road for one year.

Implementation Mechanisms:

[TWG has begun to provide input; to be discussed at next CAT meeting]

Related Policies/Programs in Place

TBD

Types(s) of GHG Reductions

TBD

Estimated GHG Savings (in 2020) and Costs per MtCO₂e

- **Data Sources:**

- **Quantification Methods:**

- **Key Assumptions:**

Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**

- **Job Creation:**

- **Reduced Fuel Import Expenditures:**

Key Uncertainties

[Insert text here]

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

F-5. Expanded Use of Biomass Feedstocks for Electricity, Heat and Steam Production

Straw Proposal Development Status: Ready for CAT Review

Based on Forestry Catalog Option 1.1

Mitigation Option Description

F-5 seeks to encourage forest product manufacturing facilities to use biomass to produce power for their own use, with surplus fed back to the energy grid. This option could be an outlet for the biomass produced as a result of policies implemented pursuant to option F-1.

Mitigation Option Design

- **Goals:** Achieve biomass generation capacity at 50% of Washington State forest products facilities by 2020; achieve biomass generation capacity at 100% of Washington State forest products facilities by 2035.

- **Timing:**

- 2010: Complete assessment of biomass generation capability for Washington State forest products facilities.

- 2020: 50% of Washington State forest products facilities will have some biomass generation capability. Pulp mills will replace aged recovery furnaces with high pressure systems or combined cycle gasification units.

- 2035: All Washington State forest products facilities will have state of the art biomass generation capability. In particular all pulp mills have either high pressure recovery furnaces or combined cycle gasification units.

- **Coverage of parties:**

- **Other:**

About 70% of Washington State electricity comes from non-carbon emitting sources, including hydroelectric and nuclear. Electricity generation, therefore, should be considered as a lower pollution avoidance priority for forest biomass utilization than solid wood products, which can sequester carbon for many decades, or for transportation fuels, which must be made from biomass to be carbon neutral and displace reliance on fossil fuels. There are opportunities, however, where local circumstances may make generation of electricity from biomass a logical energy alternative and these should be developed to the maximum extent possible. In particular, many forest product manufacturing facilities, such as pulp and paper mills and lumber mills, have co-generation capability to produce steam for industrial processes and electricity for their own use with surpluses supplied to the grid. Boilers should be state of the art such that the maximum energy is recovered from each ton of biomass. Facilities that currently do not

incorporate cogeneration capabilities represent low cost opportunities for new renewable energy investment.

- New conversion technology that is optimized for Washington State biomass may need to be developed. The timing for this type of development work would be longer than the horizon presented above.

Implementation Mechanisms:

[TWG has begun to provide input; to be discussed at next CAT meeting]

Related Policies/Programs in Place

TBD

Types(s) of GHG Reductions

TBD

Estimated GHG Savings (in 2020) and Costs per MtCO$_2$e

- **Data Sources:**
- **Quantification Methods:**
- **Key Assumptions:**

Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

Key Uncertainties

[Insert text here]

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

F-6. Improved Commercialization of Advanced Lignocellulosic Processes

Straw Proposal Development Status: Ready for CAT Review

Based on Forestry Catalog Options 1.4 and 1.2

Mitigation Option Description

F-6 seeks to develop and implement technology that can convert wood biomass to biofuels. These fuels could then be used for transportation or other uses, offsetting fossil fuel emissions that would otherwise take place. This option intersects with F-1, which seeks to reduce the buildup of fuels which can increase the risk of wildfire. This policy option will aim to promote sustainable forest management strategies which provide wood biomass for biofuels production while maintaining forest productivity,carbon storage, and integrity of forest ecosystems..

Mitigation Option Design

- **Goals:** Produce 1.36 billion gallons (50% of projected Washington State fuel demand) of biofuels from wood by 2050.

- 2012: Construct 1st commercial scale lignocellulose biorefinery to produce 100 million gallons a year of ethanol – utilizing 1.25 million tons of dry biomass per year. This refinery should be operational in 2015.

- 2020: Produce 320 million gallons of ethanol per year, using 4 million tons of dry biomass per year.

- 2035: Produce 640 million gallons of ethanol per year (8 million tons biomass per year)

- 2050: Produce 1.36 billion gallon ethanol per year (roughly half of Washington State current consumption) using 17 million tons of dry biomass per year.

- *Goals for biofuel production may be revised as information regarding biomass supply in Washington State is further refined.*

Road map to first commercial biorefinery.

- Research and analysis to support construction of 1st Washington State biorefinery.

  o Identify and assess lignocelluloses conversion technologies on Washington State biomass.

  o Perform techno- economic analysis of most promising candidates to assess technical economic feasibility

  o Assess broad environmental impact by means of life-cycle analysis or other encompassing mechanism

  Start 2008 – Complete 2011

- Construct demonstration scale biorefinery facility with best technology – 100 tons/day biomass (~ 3 million gallons fuel year)

  Start 2010 – Complete 2012

- Construction commercial scale biorefinery (3500 tons/day biomass) 100 million gallons of fuel/ year

  Start 2012 – Complete 2015

  Note this last point is inconsistent with goal above, which states completion and production of 100 million gallons/ year by 2012 (this says operational by 2015)

- **Timing**: See goals above

- **Coverage of parties:**

- **Other:** Conservatively there are 17 million tons of biomass that could be used for manufacture of fuels and energy available annually in Washington. About eight million tons of that is forestry biomass. Much more forestry biomass is available if you consider use of forest slash currently left in the woods, and all the biomass that should be removed for fire treatment. The US Forest Service estimates that a total of 240 million tons of wood biomass needs to be removed from eastside forests to reduce surplus fuel loads and forest fire hazard. Effective use of this biomass would significantly reduce Washington State green house gas emissions. Use of all eight million tons of forest biomass to produce 640 million gallons of transportation fuels would reduce Washington's greenhouse gas emissions by about 4 MMTCo2e (annually?). In contrast, if this 640 million gallons were produced from corn it would only reduce green house gas emissions by about 0.5 MMT CO2e (also annually?). Further, reducing incidence and magnitude of forest fires by removing forest thinning and slash for fuel production could avoid CO_2 releases from smoke equivalent to an additional 2 MMTCO2e per year.

- New conversion technology that is optimized for Washington State biomass may need to be developed. The timing for this type of development work would be longer than the horizon presented above.

Implementation Mechanisms:

      [TWG has begun to provide input; to be discussed at next CAT meeting]

Related Policies/Programs in Place

      [TWG has begun to provide input; to be discussed at next CAT meeting]

Types(s) of GHG Reductions

TBD

Estimated GHG Savings (in 2020) and Costs per MtCO$_2$e

- **Data Sources:**

- **Quantification Methods:**

- **Key Assumptions:**

Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

Key Uncertainties

[Insert text here]

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

F-7. Enhanced Carbon Sequestration in Harvested Wood Products

Straw Proposal Development Status: Ready for CAT Review

Based on Forestry Catalog Option 2.5

Mitigation Option Description

This policy is focused on recognizing and improving the climate benefits of managing forests for wood production. Washington State is uniquely positioned to take advantage of the climate benefits of durable wood products, because the native Douglas-fir forests have high productivity rates and extremely desirable structural characteristics for long-lived wood products. Washington State can provide abundant sources of raw materials and has the infrastructure to manufacture these materials into products.

Mitigation Option Design

- **Goals:** To increase the production of durable wood products for non-structural uses from Washington forests by 10% by 2050.

- **Timing:** See goals above. The demand for wood products should increase as the climate benefits of using a product with low embodied energy (in many cases a negative carbon footprint) is realized. See F-4 for more information on the expanded use of wood products for building materials.

- **Coverage of parties:**

- **Other:** The long-term carbon storage contribution of Washington State's wood product production is roughly 11.8 million metric tons CO2e/yr[5], which offsets more than 10 percent of Washington's greenhouse gas emissions.

- These goals assume no additional barriers to efficient management of timberlands and production capacity.

Implementation Mechanisms:

[TWG has begun to provide input; to be discussed at next CAT meeting]

Related Policies/Programs in Place

TBD

Types(s) of GHG Reductions

TBD

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[5] From draft of state inventory

Estimated GHG Savings (in 2020) and Costs per MtCO$_2$e

- **Data Sources:**
- **Quantification Methods:**
- **Key Assumptions:**

Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

Key Uncertainties

[Insert text here]

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD

F-8. Urban and Community Forests

Straw Proposal Development Status: Ready for CAT Review

Based on Forestry Catalog Option

Mitigation Option Description

Option F-8 seeks to establish and maintain a net increase of urban and community forest in Washington. Tree planting and maintenance in urban and suburban areas has multiple benefits, including reducing greenhouse gas emissions due to energy conservation (primarily reduced demand for cooling in hot weather), offsetting greenhouse gas emissions due to enhanced C sequestration, and reducing urban sprawl by providing desirable living spaces.

Other benefits of urban and community forests (i.e. improving air quality, reducing storm water runoff, improving aesthetics) make it a highly desirable community investment for reasons beyond the benefits to climate change.

Mitigation Option Design

- **Goals:** *By the year 20XX, the state will have enabled Washington's local governments, utilities and large urban landowners to plant and maintain an <u>additional</u> XX million trees, and increase the quality of urban forests to*

  - conserve energy
  - reduce greenhouse gas emissions
  - offset green house gases (and tapping emerging carbon markets)
  - benefit healthy neighborhoods and business districts, and to
  - reduce sprawl

- **Timing:** Dependent on funding available and timing of The Carbon Registry timing for development / adoption of urban forest greenhouse gas reporting protocols.

- **Coverage of parties:**

- **Other:**

Trees of the **urban forest modify climate and conserve building-energy** use in three principle ways:

  ➢ Shading—reduces the amount of radiant energy absorbed and stored by built surfaces.

> ➢ Transpiration—converts moisture to water vapor and thus cools by using solar energy that would otherwise result in heating of the air.
> ➢ Wind speed reduction—reduces the infiltration of outside air into interior spaces and conductive heat loss where thermal conductivity is relatively high (e.g. glass windows)[6]

Urban Forests can reduce atmospheric CO$_2$ in two ways:

> ➢ Trees directly sequester Co2 as woody and foliar biomass while they grow, and
> ➢ Trees near buildings can reduce the demand for heating and air conditioning, thereby reducing emissions associated with electric power production. [6]

Treed Communities can concentrate consumers and residents:

> ➢ Consumers shop longer, more frequently and are willing to pay more for goods/services in well-landscaped business districts
> ➢ Well maintained trees maintain the "curb-appeal" of properties
> ➢ Treed cities are desirable communities with stronger communities, less crime, cleaner air, less noise, more wildlife and improved aesthetics. [6]

> > o **Definitions: (place holder)**
> > > • *Urban Forest:*
> > > • *Community Forest:*
> > > • *Exurban Forest:*
> > o **Community & Urban Forest fragmentation/conversion rates: (place holder)**

Implementation Mechanisms:

[TWG has begun to provide input; to be discussed at next CAT meeting]

Related Policies/Programs in Place

[TWG has begun to provide input; to be discussed at next CAT meeting]

Types(s) of GHG Reductions

TBD

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[6] Mcpherson, E.G.; Maco, S.E.; Simpson, J.R.; Peper, P.J.; Xiao, Q.; VanDerZanden, A.M.; Bell, N.; 2002. **Western Washington and Oregon Community Tree Guide: Benefits, Costs and Strategic Planting**. Center for Urban Forest Research, USDA Forest Service, Pacific Southwest Research Station.
http://www.fs.fed.us/psw/programs/cufr/products/5/CUFR_164_Western_WA_OR_Tree_Guide.pdf

Estimated GHG Savings (in 2020) and Costs per MtCO$_2$e

- **Data Sources:**
- **Quantification Methods:**
- **Key Assumptions:**

Contribution to Other Goals

- **Contribution to Long-term GHG Emission Goals (2035/2050):**
- **Job Creation:**
- **Reduced Fuel Import Expenditures:**

Key Uncertainties

[Insert text here]

Additional Benefits and Costs

TBD

Feasibility Issues

TBD

Status of Group Approval

TBD

Level of Group Support

TBD

Barriers to Consensus

TBD